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Observations of the Solar Eclipse 1879, *July* 18, *made at the University Observatory, Strasburg.* By Prof. A. Winnecke.

The morning of July 19 was extremely cloudy. Different observers with smaller telescopes got neither the beginning nor the end of the eclipse. I was myself a little more fortunate. The Refractor by Merz which I used has an aperture of 101^{mm}; and a polarisation eye-piece, power 105, was applied. At $3^{\mathrm{h}}\ 50^{\mathrm{m}}\ 15^{\mathrm{s}}$ Strasburg sidereal time, clouds left the Sun; the eclipse had just commenced.

The end was, between thick clouds, very uncertainly observed at $4^{\mathrm{h}}\ 27^{\mathrm{m}}\ 50^{\mathrm{s}}\cdot5$ Strasburg sidereal time.

From this account it is clear that, in the ordinary way of observing a partial solar eclipse, this one would have been nearly lost for Strasburg; but fortunately we have taken measures with the Heliometer. I had asked Herr Hartwig, Assistant of the Observatory, to profit by every bit of clear sky; he was aided by Dr. Küstner, who read the microscopes of the scales and of the position-circle.

Herr Hartwig obtained seven measures of the length of the chord joining the cusps, and seven angles of position of it; the power of the eye-piece was 170.

Diminishing the *Nautical Almanac* R.A. of the Moon by $10''\cdot0$ and correcting by $-1''\cdot90$ the *Nautical Almanac* semidiameter of the Sun, and by $-2''\cdot30$ the *Nautical Almanac* semi-

diameter of the Moon (see *Monthly Notices*, vol. xxxvi., p. 86), Herr Hartwig obtained the equations:

Measures of length of chord connecting the cusps.

$$0 = -23''\!\cdot\!09 + 4\cdot016\,dr + 4\cdot019\,dR + 1\cdot132\,dx + 3\cdot722\,dy + i.$$
$$0 = -18\cdot88 + 4\cdot037\,dr + 4\cdot090\,dR + 0\cdot684\,dx + 3\cdot853\,dy + i.$$
$$0 = -18\cdot59 + 4\cdot263\,dr + 4\cdot266\,dR + 0\cdot566\,dx + 4\cdot106\,dy - i.$$
$$0 = -25\cdot44 + 4\cdot570\,dr + 4\cdot573\,dR + 0\cdot476\,dx + 4\cdot435\,dy - i.$$
$$0 = -28\cdot39 + 5\cdot046\,dr + 5\cdot047\,dR + 0\cdot384\,dx + 4\cdot930\,dy - i.$$
$$0 = -28\cdot17 + 6\cdot026\,dr + 6\cdot015\,dR + 0\cdot270\,dx + 5\cdot924\,dy - i.$$
$$0 = -31\cdot90 + 7\cdot605\,dr + 7\cdot605\,dR + 0\cdot164\,dx + 7\cdot537\,dy + i.$$

Measures of angle of position of the chords.

$$0 = +3''\!\cdot\!10 - 0\cdot246\,dx + 0\cdot075\,dy + \gamma - \delta.$$
$$0 = -4\cdot99 - 0\cdot252\,dx + 0\cdot045\,dy + \gamma + \delta.$$
$$0 = -3\cdot66 - 0\cdot239\,dx + 0\cdot033\,dy - \gamma + \delta.$$
$$0 = +4\cdot08 - 0\cdot214\,dx + 0\cdot020\,dy - \gamma - \delta.$$
$$0 = +5\cdot59 - 0\cdot210\,dx + 0\cdot016\,dy - \gamma - \delta.$$
$$0 = -3\cdot62 - 0\cdot168\,dx + 0\cdot008\,dy - \gamma + \delta.$$
$$0 = +4\cdot19 - 0\cdot133\,dx + 0\cdot003\,dy + \gamma - \delta.$$

In these equations the symbols denote:

dr = Correction to the adopted semi-diameter of the Sun.

dR = ,, ,, ,, Moon.

dx = ,, ,, excess of Moon's R.A. over Sun's R.A.

dy = ,, to excess of Moon's Decl. over Sun's Decl.

i = ,, of adopted point of coincidence of images.

γ = Distance of optical centres of the halves of the object-glass.

δ = Error committed by the observer in rotating the object-glass in arc of great circle.

By treating the fourteen equations according to the method of least squares, Herr Hartwig obtained the final equations:

$$2\cdot857\,dx + 15\cdot968\,dy + 0\cdot284\,i + 0\cdot191\,\gamma + 0\cdot135\,\delta - 86''\!\cdot\!073 = 0.$$
$$15\cdot968\,dx + 181\cdot442\,dy - 4\cdot283\,i + 0\cdot046\,\gamma - 0\cdot028\,\delta - 895\cdot069 = 0.$$
$$0\cdot284\,dx - 4\cdot283\,dy + 7\cdot000\,i + 0\cdot000\,\gamma + 0\cdot000\,\delta + 26\cdot720 = 0.$$
$$0\cdot191\,dx + 0\cdot046\,dy + 0\cdot000\,i + 7\cdot000\,\gamma - 1\cdot000\,\delta - 0\cdot390 = 0.$$
$$0\cdot135\,dx - 0\cdot028\,dy + 0\cdot000\,i - 1\cdot000\,\gamma + 7\cdot000\,\delta - 28\cdot930 = 0.$$

Hence:

$$dx = +5''{\cdot}173 - 0{\cdot}224\, dr - 0{\cdot}229\, dR.$$
$$dy = +4{\cdot}448 - 1{\cdot}006\, dr - 1{\cdot}006\, dR.$$
$$i = -1{\cdot}306 + 0{\cdot}000\, dr - 0{\cdot}001\, dR.$$
$$\gamma = +0{\cdot}474 + 0{\cdot}013\, dr + 0{\cdot}013\, dR.$$
$$\delta = +4{\cdot}119 + 0{\cdot}002\, dr + 0{\cdot}002\, dR.$$

The probable error of an observation is $1''{\cdot}48$; it would have been sensibly smaller had there not been so many clouds, which are very dangerous for double-image measures. Nevertheless, the position of the Moon is rigidly determined.

Taking the *Nautical Almanac* R.A. of the Sun as correct, we have:—

Correction to Moon's R.A.	$-4''{\cdot}47 - 0{\cdot}224\, dr - 0{\cdot}229\, dR$	$\pm 1''{\cdot}26$	prob. error.
Correction to Moon's Decl.	$+4{\cdot}45 - 1{\cdot}006\, dr - 1{\cdot}006\, dR$	$\pm 0{\cdot}16$	„

With these corrections and the values of the diameters adopted in the former calculations, the end of the eclipse is $4^h\ 28^m\ 19^s{\cdot}5$ Strasburg sidereal time. I thus lost the Moon very early; but it must be remembered that the rate of separation of the limb of the Sun and the Moon is extremely slow, the distance of the centres changing about $1''$ of arc in every 10^s of time.

Strasburg, 1879, *Nov.* 5.

On the Polarisation of the Solar Corona.

By Arthur Schuster, Ph.D., F.R.S.

1.—Introductory.

Accurate measurements of the polarisation of the light sent out by the solar corona will most likely give us some important information on the nature of the Sun's surroundings. It is therefore a matter of interest to calculate the polarisation due to the scattering of light by a particle placed in the neighbourhood of a luminous sphere.

Before we can apply the theoretical results to the actual phenomenon, we must take account of all the particles along one given line of sight. We cannot do this, as we do not know the law of distribution of the scattering particles round the luminous sphere. We are therefore obliged to discuss various possible laws, and to see how the theoretical results agree with observed facts. A further complication is introduced by a large and unknown quantity of unpolarised light mixed up with the corona and most likely due to incandescence. Our problem is an inverse one, and seems at first sight very hopeless. From the observed polarisation of light we are to find out what part of it is due to